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1160 W. Orange Grove Ave., Arcadia, California, U.S.A.

IS AIR POLLUTION RESPONSIBLE FOR MELANISM IN LEPIDOPTERA AND FOR SCARCITY OF ALL ORDERS OF INSECTS IN NEW JERSEY?

JOSEPH MULLER
R. D. 1, Lebanon, New Jersey

About forty years ago some very light forms of moths were collected in New Jersey by the late Messrs. Otto Buchholz, Frederick Lemmer and Charles Rummel. In thirty-five years of collecting all over New Jersey I have never found those light forms in the wild, nor have I seen them in any other recent collections. Some of these moths were the very light form of *Catocala connubialis* Gn., a very light form of *C. ilia* Cram. from Lakehurst, and the nearly white female of *Nacophora quernaria* A. & S.

During my years of collecting I found that *Catocala connubialis* first changed to the dark form *pulverulenta* Br. and lately to all melanic *broweri* M. *C. ilia* changed to gray and blackish forms. Females of *N. quernaria* changed to the melanic form *atrescens* Hulst. Only a few male *N. quernaria* show some light crosslines. Many more light forms of moths have changed to melanistic and melanic forms during recent years. Furthermore these dark forms seem to be on the increase, especially in some Noctuid genera such as *Acronicta*.

Several theories about the cause of melanism have appeared in different journals: genetic isolation, adaptation to dark surroundings and industrial melanism (now called smog). In some areas one or two of these influences may have combined.

The southern part of New Jersey is all flat and consists of orchards, blueberry and cranberry farms, scrub oak barrens and some patches of forest. There are only a few industries, and they do not produce enough smog to obscure the sun. What little smog there is, will be swept away by strong winds or convection. In this part of New Jersey only a few dark forms of moths occur.

In the northern part of the state it is a different story. New Jersey, the most densely populated state in the country, has also the most automobiles per citizen. These cars and hundreds of buses and trucks passing through to New York are concen-

trated here and seem to be the cause of the worst air pollution. Only 40 to 50 miles from where I live are three large jet airports sending 1 to 5 jets overhead every minute in Hunterdon Co., N. J. Two miles before reaching the Newark meadows one can see and smell the smoke caused by burning garbage. Finally, most of the factories in New Jersey are located in the northern part. The Department of Air Resources publishes a daily smog index in the New York Daily News. It indicates air conditions which are good, acceptable, unsatisfactory or unhealthful. I picked seven days at random with these results: 4 days unhealthful, 2 days unsatisfactory, and one day acceptable.

I believe that air pollution combined with acrial spraying of insecticides over the whole state is responsible for a sharp decrease in Lepidoptera and all other orders of insects. In Hunterdon County alone, where I live, seven areas are routinely sprayed. It hardly pays to put up my black lights. Even toads feeding on insects on the ground and bats catching them in the air are scarce. Only a few years ago my lights were loaded with so many insects, especially small Diptera and Coleoptera, that I could hardly breathe. Those times seem to be gone forever.

CONCLUSION

In southern New Jersey, where there are hardly any industries, Lepidoptera of "normal" forms are dominant, for they are adapted to the open light surroundings. The few dark forms, mostly singletons, might come from dense patches of forest. In the northern part of the state, where more melanic forms appear in greater numbers than in the southern part, the question "Is air pollution responsible for melanism in Lepidoptera and for scarcity of all Orders of insects" is still open and cannot be answered unequivocally. My own belief is that smog alone, which filters out some components of sunlight, is the major cause of melanism. I believe that smog and spraying of insecticides combined, are responsible for the scarcity of insects. No changes have been found in vegetation so far, as I was told by an eminent botanist, except that lichens are diminishing in the metropolitan area.

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